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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MOHAMMED JAVED ABSAR,
SAPNA GEORGE,
and ANTONIO MARIO ALVEREZ-TINOCO

Appeal 2007-1735
Application 09/622,736[1]
Technology Center 2600

Decided: January 8, 2008

Before JOHN C. MARTIN, ANITA PELLMAN GROSS, and MARC S. HOFF, *Administrative Patent Judges*.

HOFF, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF -CASE

Appellants appeal under 35 U.S.C. § 134 from a Final Rejection of claims 1-39. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellants' invention relates to a method of digital audio coding. Frequency domain transformation of signals is performed by the modified

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[1] Application filed October 27, 2000. The real party in interest is STMicroelectronics Asia Pacific PTE Limited.

discrete cosine transform (MDCT). The number of computations involved can be significantly reduced if the MDCT equation can be computed in a form that is amenable to the Fast Fourier Transform (FFT) method (Specification 1-2).

Claims 1 and 10 are exemplary:

> 1. A method for coding audio data comprising a sequence of digital audio input samples, including the steps of:
>
> i) multiplying the sequence of digital audio input samples with a first trigonometric function factor to generate an intermediate sample sequence;
>
> ii) computing a fast Fourier transform of the intermediate sample sequence to generate a Fourier transform coefficient sequence;
>
> iii) for each transform coefficient in the sequence, multiplying the real and imaginary components of the transform coefficient by respective second trigonometric function factors, adding the multiplied real and imaginary transform coefficient components to generate an addition stream coefficient, and subtracting the multiplied real and imaginary transform coefficient components to generate a subtraction stream coefficient;
>
> iv) multiplying the addition and subtraction stream coefficients with respective third trigonometric function factors; and
>
> v) subtracting the corresponding multiplied addition and subtraction stream coefficients to generate audio coded frequency domain coefficients.

10. A method for coding audio data, including the steps of:

combining first and second sequences of digital audio samples from first and second audio channels into a single complex sample sequence;

processing the complex sample sequence by multiplying the input sequence samples by a first trigonometric function;

determining a Fourier transform coefficient sequence;

generating first and second transform coefficient sequences by combining and/or differencing first and second selected transform coefficients from said Fourier transform coefficient sequences; and

for each of the first and second transform coefficient sequences, generating audio coded frequency domain coefficients to generate respective sequences of said audio coded frequency domain coefficients for the first and second audio channels.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Fielder	US 5,479,562	Dec. 26, 1995
Jhung	US 6,304,847 B1	Oct. 16, 2001

John G. Proakis, *Digital Signal Processing Principles, Algorithms, and Applications,* Third Edition, 290-91, 415, 475-77 (1996).

Claims 1-9 and 17-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fielder.

Claims 10-13, 16, and 24-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fielder in view of Proakis.

Claims 14, 15, and 28-39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fielder in view of Proakis and Jhung.

Appellants contend that the Examiner erred in his rejections because Fielder does not teach the intermediate mathematical steps used by the Examiner to arrive at the result claimed by Appellants. The Examiner contends the claims are properly rejected because the intermediate steps would have been obvious to the person having ordinary skill in the art, who would have possessed the necessary basic trigonometry skills, in order to provide a complete computation algorithm by modulating the signals and reducing computational complexity.

Rather than repeat the arguments of Appellants or the Examiner, we make reference to the Briefs and the Answer for their respective details. Only those arguments actually made by Appellants have been considered in this decision. Arguments that Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

ISSUE

The principal issue in the appeal before us is whether the Examiner erred in holding that it would have been obvious to derive the equations described in the claimed invention via trigonometric identities, starting from the equations taught by the reference.

FINDINGS OF FACT

The following Findings of Fact (FF) are shown by a preponderance of the evidence.

The Invention

1. According to Appellants, they have invented a method and apparatus for digital audio coding including generating a Fourier transform coefficient sequence from the input sample sequence by computing a fast Fourier transform (Specification 2-3).

2. Appellants' Claim 28 is the apparatus version of method claim 1, and claim 37 is the apparatus version of method claim 10. In claim 28, "post-multiplication factors" are analogous to claim 1's "trigonometric function factors," "differencing" corresponds to "subtracting," and "combining" corresponds to "adding."

Fielder

3. Fielder teaches an encoder for the digital encoding of wideband audio information (col. 7, ll. 12-13).

4. Fielder teaches elements (i), (ii), (iv), and (v) of Appellants' claim 1 (Ans. 3-5; col. 35, l. 35 – col. 36, l. 35).

Proakis

5. Proakis teaches providing a Fast Fourier Transform algorithm to perform a single Discrete Fourier Transform for two real signal (i.e., two-channel) sequences by using the symmetry properties of the Fourier transform (pp. 475-476).

Jhung

6. Jhung teaches a method for a dual-mode audio decoding which performs the inverse modified discrete cosine transform (IMDCT) of an MPEG file using the FFT transform of the IMDCT component of AC-3 specific hardware (col. 2, ll. 53-56).

PRINCIPLES OF LAW

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). The Examiner can satisfy this burden by showing some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) (*citing In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the Appellant. *Piasecki*, 745 F.2d at 1472. Thus, the Examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the Examiner's conclusion.

As was recently described in *In re Kahn*, 441 F.3d 977 (Fed. Cir. 2006):

> [T]he "motivation-suggestion-teaching" test asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have

> been led to make the combination recited in the claims. From this it may be determined whether the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art – i.e., the understandings and knowledge of persons having ordinary skill in the art at the time of the invention-support the legal conclusion of obviousness. (internal citations omitted).

Id. at 988. To establish a prima facie case of obviousness, the references being combined do not need to explicitly suggest combining their teachings. *See id.* at 987-88 ("the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references"). "'The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.'" *Id.* at 987-88 (quoting *In re Kotzab,* 217 F.3d 1365, 1370 (Fed. Cir. 2000)).

ANALYSIS

Claims 1-9 and 17-23

Appellants argue that the Examiner erred in rejecting claims 1-9 and 17-23 as being obvious over Fielder, because Fielder fails to teach performing the intermediate reasoning steps provided by the Examiner in his explanation of why the claimed invention would have been obvious given Fielder's teachings (Reply Br. 3). Appellants argue that the fact that Fielder *could* have been modified to use the recited steps does not mean that Fielder in fact taught or suggested those steps (*id.*).

We disagree with Appellants' characterization of the rejection. The Examiner states, and Appellants do not contest, that Fielder teaches elements (i) and (ii) of claim 1 (FF 4). With respect to elements (iii), (iv), and (v), the Examiner starts with equations (6) and (28) expressly taught by Fielder (Ans. 4:5-6). From those equations, the Examiner applies basic algebraic techniques and trigonometric identities in order to demonstrate that the content of Fielder's equations is in fact *equivalent* to the result of Specification Equation 16, and that such content teaches the limitations of not only elements (iii), (iv), and (v) of claim 1, but also dependent claims 8 and 9, which are the narrowest of Appellants' claims that depend on claim 1 (Ans. 4:7-15).

Appellants characterize the issue as being that the Examiner supplied a series of steps to be added to the teachings of Fielder to arrive at the claimed invention (Reply Br. 3). Appellants object to the Examiner's "steps" because (a) Fielder does not expressly teach them, and (b) the "steps" are one of "a host of alternative ways" to meet the claim language, and the Examiner has not established why this particular alternative would have been chosen (*id.*). We agree with the Examiner, however, that this case does not present a situation where a number of missing method steps are being proposed by the Examiner without proper teaching or motivation. To the contrary, the Examiner's mathematical reasoning merely transforms the teachings of Fielder's equations (6) and (28) into equivalent mathematical expressions, thereby deriving, *inter alia*, the "addition stream coefficient" and "subtraction stream coefficient" claimed. Regarding Appellant's above-noted argument that the Examiner has not established why the particular

alternative (i.e., the selected trigonometric identity) would have been chosen, we direct Appellant's attention to the following passage in *KSR*:

> When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under §103.

KSR, 127 S. Ct. at 1742.

We observe that Appellants make no argument that the Examiner's mathematical reasoning is incorrect, *i.e.,* that it fails to meet the claim limitations at issue.

We therefore find that Appellants have not presented any persuasive argument that the Examiner has not made out a *prima facie* case of obviousness, or any argument that the asserted combination is improper. As a result, we affirm the rejection of claims 1 and 17, as well as claims 2-9 and 18-23, dependent therefrom and not separately argued.

Claims 10-13, 16, and 24-27

Appellants argue that the combination of Fielder and Proakis fails to render the claimed invention obvious because the Examiner continues to rely on and incorporate the faulty reasoning the Examiner applied to claim 1 (Reply Br. 5). Because we find *supra* that the Examiner properly rejected claim 1, we find Appellants' argument unpersuasive, and we affirm the rejection of claims 10-13, 16, and 24-27.

Claims 14, 15, and 28-39

Appellants argue that the combination of Fielder, Proakis, and Jhung fails to render the claimed invention obvious. With regard to claims 14 and 15, dependent from claim 10, Appellants argue that Jhung fails to supply the teachings previously asserted to be missing from the combination of Fielder and Proakis with respect to claim 10 (Reply Br. 6). With regard to claims 28-39, Appellants argue that the "post-transform processor" of claim 28 is not taught or suggested by Fielder, and that the "first and second sequences of digital audio samples" and "pre-transform processor" of claim 37 are not met by the combination of references (*id.*). Finally, Appellants again assert that the Examiner relies on the same faulty reasoning applied to claim 1 (Reply Br. 6-7).

We find that Claim 28, however, is merely the apparatus version of method claim 1, and claim 37 is the apparatus version of method claim 10. In claim 28, "post-multiplication factors" are analogous to claim 1's "trigonometric function factors," "differencing" corresponds to "subtracting," and "combining" corresponds to "adding" (FF 2). Claim 37 depends from claim 28 and contains first and second sequences of digital audio samples.

Because we find *supra* that claims 1 and 10 are properly rejected by the Examiner, we find each of Appellants' arguments unpersuasive. The Examiner's reasoning may readily be adapted from method claims 1 and 10 to equivalent apparatus claims 28 and 37, respectively.

We therefore affirm the rejection of claims 14, 15, 28, and 37, as well as dependent claims 29-36, 38, and 39, dependent from claim 28 and not separately argued.

CONCLUSION OF LAW

We conclude that Appellants have not shown that the Examiner erred in rejecting claims 1-39. Claims 1-39 are not patentable.

DECISION

The Examiner's rejection of claims 1-39 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

KIS

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